

What is claimed is;

1. A driving assist system for a vehicle, comprising:  
a traveling condition recognition device that detects  
5 a state of the vehicle and a traveling environment of the  
vehicle;

a risk potential calculation device that calculates a  
risk potential present around the vehicle based upon  
detection results obtained by the traveling condition  
10 recognition device;

a reaction force adjustment device that adjusts  
reaction force characteristics of a vehicle operating device  
based upon the risk potential calculated by the risk potential  
calculation device;

15 an external influence detection device that detects an  
external influence which will affect an operation of the  
vehicle operating device by a driver; and

a reaction force correction device that corrects the  
reaction force characteristics of the vehicle operating  
20 device adjusted by the reaction force adjustment device,  
based upon detection results obtained by the external  
influence detection device.

2. A driving assist system for a vehicle according to claim  
25 1, wherein:

the reaction force adjustment device adjusts at least one of reaction force characteristics of an accelerator pedal and reaction force characteristics of a steering device as the reaction force characteristics of the vehicle operating device.

3. A driving assist system for a vehicle according to claim 1, wherein:

the reaction force adjustment device adjusts reaction force characteristics of an accelerator pedal as the reaction force characteristics of the vehicle operating device;

the external influence detection device detects a state of inclination of a lane on which the vehicle is traveling as the external influence; and

the reaction force correction device corrects the reaction force characteristics of the accelerator pedal in conformance to the state of inclination of the lane detected by the external influence detection device.

4. A driving assist system for a vehicle according to claim 1, wherein:

the reaction force adjustment device adjusts reaction force characteristics of a steering device as the reaction force characteristics of the vehicle operating device;

the external influence detection device detects a

curving direction of a lane on which the vehicle is currently traveling and a direction along which the risk potential is present as the external influence; and

the reaction force correction device corrects the  
5 reaction force characteristics of the steering device in conformance to the curving direction of the lane and the direction along which the risk potential is present relative to the vehicle detected by the external influence detection device.

10

5. A driving assist system for a vehicle according to claim 3, wherein:

the reaction force adjustment device calculates a reaction force adjustment quantity for the accelerator pedal  
15 in correspondence to the risk potential and adjusts the reaction force characteristics of the accelerator pedal by incorporating the reaction force adjustment quantity; and

the reaction force correction device makes a correction so as to reduce the reaction force adjustment quantity  
20 calculated by the reaction force adjustment device if the lane is an uphill lane and makes a correction so as to increase the reaction force adjustment quantity calculated by the reaction force adjustment device if the lane is a downhill lane.

25

6. A driving assist system for a vehicle according to claim 4, wherein:

the reaction force adjustment device calculates a reaction force adjustment quantity for the steering device in correspondence to the risk potential and adjusts the reaction force characteristics of the steering device by incorporating the reaction force adjustment quantity; and the reaction force correction device, (a) corrects the reaction force adjustment quantity calculated by the reaction force adjustment device if the curving direction and the direction along which the risk potential is present do not match and (b) leaves the reaction force adjustment quantity calculated by the reaction force adjustment device if the curving direction and the direction along which the risk potential is present match.

7. A driving assist system for a vehicle according to claim 6, wherein:

the reaction force correction device; (a) incorporates the reaction force adjustment quantity along both a steering direction matching the curving direction and a steering direction opposite from the curving direction when the curving direction and the direction along which the risk potential is present match and (b) incorporates the reaction force adjustment quantity along the steering direction

matching the curving direction and incorporates the corrected  
reaction force adjustment quantity along the steering  
direction opposite from the curving direction when the  
curving direction and the direction along which the risk  
5 potential is present do not match.

8. A driving assist system for a vehicle according to claim  
6, wherein:

the reaction force correction device; (a) incorporates  
10 the reaction force adjustment quantity along both a steering  
direction matching the curving direction and a steering  
direction opposite from the curving direction when the  
curving direction and the direction along which the risk  
potential is present match and (b) incorporates the corrected  
15 reaction force adjustment quantity along the direction  
opposite from curving direction without incorporating the  
reaction force adjustment quantity along the steering  
direction matching the curving when the curving direction and  
the direction along which the risk potential is present do  
20 not match.

9. A driving assist system for a vehicle according to claim  
6, wherein:

the reaction force correction device; (a) changes an  
25 inclination of the reaction force characteristics by

incorporating the reaction force adjustment quantity along both a steering direction matching the curving direction and a steering direction opposite from the curving direction when the curving direction and the direction along which the risk potential is present match and (b) changes the inclination of the reaction force characteristics by incorporating the corrected reaction force adjustment quantity along the steering direction opposite from the curving direction without altering the inclination of the reaction force characteristics along the steering direction matching the curving direction when the curving direction and the direction along which the risk potential is present do not match.

10. A driving assist system for a vehicle according to claim 7, wherein:

the traveling condition recognition device detects at least a steering angle of the steering device; and

the reaction force correction device corrects the reaction force adjustment quantity based upon the risk potential and the steering angle.

11. A driving assist system for a vehicle according to claim 8, wherein:

the traveling condition recognition device detects at

least a steering angle of the steering device; and  
the reaction force correction device corrects the  
reaction force adjustment quantity based upon the risk  
potential and the steering angle.

5

12. A driving assist system for a vehicle, according to  
claim 9, wherein:

the traveling condition recognition device detects at  
least a steering angle of the steering device; and

10 the reaction force correction device corrects the  
reaction force adjustment quantity based upon the risk  
potential and the steering angle.

13. A driving assist system for a vehicle according to claim  
15 1, wherein:

the external influence detection device detects a  
driver's perception of a reaction force generated at the  
vehicle operating device as the external influence.

20 14. A driving assist system for a vehicle according to claim  
13, wherein:

the vehicle operating device is an accelerator pedal;  
and

25 the external influence detection device detects a state  
of depression of the accelerator pedal to judge the driver's

perception, wherein the external influence detection device judges the driver's perception to be acute if an extent to which the accelerator pedal is depressed is being increased and judges the driver's perception to be dull if the extent of depression is being decreased.

15. A driving assist system for a vehicle according to claim 14, wherein:

the external influence detection device estimates the state of depression based upon a running resistance of the vehicle.

16. A driving assist system for a vehicle, comprising:

a traveling condition recognition means for detecting a state of the vehicle and a traveling environment of the vehicle;

a risk potential calculation means for calculating a risk potential present around the vehicle based upon detection results obtained by the traveling condition recognition means;

a reaction force adjustment means for adjusting reaction force characteristics of a vehicle operating device based upon the risk potential calculated by the risk potential calculation means;

an external influence detection means for detecting an



external influence which will affect an operation of the vehicle operating device by a driver; and

a reaction force correction means for correcting the reaction force characteristics of the vehicle operating device adjusted by the reaction force adjustment means, based upon detection results obtained by the external influence detection means.

17. A vehicle driving assist method, comprising:

detecting a state of a vehicle and a traveling environment of the vehicle;

calculating a risk potential present around the vehicle based upon the state of the vehicle and the traveling environment of the vehicle;

adjusting reaction force characteristics of a vehicle operating device based upon the risk potential;

detecting an external influence which will affect an operation of the vehicle operating device by a driver; and

correcting the reaction force characteristics of the vehicle operating device adjusted according to the risk potential, based upon the external influence.

18. A vehicle, comprising:

a traveling condition recognition device that detects a state of the vehicle and a traveling environment of the

vehicle;

a risk potential calculation device that calculates a risk potential present around the vehicle based upon detection results obtained by the traveling condition

5 recognition device;

a reaction force adjustment device that adjusts reaction force characteristics of a vehicle operating device based upon the risk potential calculated by the risk potential calculation device;

10 an external influence detection device that detects an external influence which will affect an operation of the vehicle operating device by a driver; and

a reaction force correction device that corrects the reaction force characteristics of the vehicle operating  
15 device adjusted by the reaction force adjustment device,  
based upon detection results obtained by the external influence detection device.

20